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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/609,387	07/03/2000	T. Frank Wang	8229-006-27	3989

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EXAMINER

PEREZ RAMOS, VANESSA

ART UNIT PAPER NUMBER

1765

DATE MAILED: 03/13/2003

1/

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/609,387

Applicant(s)

WANG, T. FRANK

Examiner

Vanessa Perez-Ramos

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12/16/02.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1, 15 and 31 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. In the aforementioned claims, Applicant claims an etchant chemistry which is free of BCL3. However, Applicant's Specification discloses that BCl3 CAN be present in the etchant chemistry, as long as it is not the source of the chlorine. Therefore, the limitation that BCl3 can not be present at all in the etchant chemistry represents new matter.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-4, 6 and 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (U.S. 5,545,289) in view of Hoh et al. (U.S. 5,874,363).

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In regard to claims 1-4, 6 and 9-11, Chen discloses a method for etching a semiconductor device comprising: providing a device having a plurality of layers, including a layer comprising a refractory metal containing material, including a Ti-W alloy (col. 19, lines 43-46); and etching with a composition comprising a first etchant chemistry which comprises a chlorine source, including Cl₂ (col. 19, lines 56-60), and further comprises N₂ (col. 19, line 60), and a second etchant which is free of fluorine (col. 20, lines 15-17), and further comprises a chlorine source, including Cl₂ (col. 20, line 16).

Contrary to the claimed invention, Chen does not disclose that the etchant chemistry is free of BCl₃.

Hoh discloses an etch chemistry with a chlorine source, and discloses that it is preferable that the etchant is free of BCl₃, so as to obtain a slower, more controllable rate of material removal, and a low risk of damage (col. 2, lines 60-67 and col. 3, lines 1-6).

It is the Examiner's position that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Chen by utilizing an etchant chemistry free of BCl₃, because this would allow for better etching, more control over the process and lower damage, which are extremely important considerations during semiconductor manufacturing.

5. Claims 5, 7-8 and 12-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (U.S. 5,545,289) in view of Hoh (U.S. 5,874,363) as applied to claims 1-4, 6 and 9-11 above, and in view of Shoji (U.S. 5,853,602).

In regard to claims 5 and 7, Chen in view of Hoh does not disclose that the first etchant further comprises a fluorine source.

Shoji discloses a method comprising: providing a semiconductor device having a plurality of layers, including a refractory metal containing layer and an oxide layer, and etching

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with an etchant comprising a chlorine and a fluorine source, wherein the chlorine source can be Cl_2 , and the fluorine source can be SF_6 (col. 2, lines 9-24). Furthermore, Shoji discloses that this etchant provides an improved etching rate and selectivity between a refractory metal layer and SiO_2 .

It is the Examiner's position that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Chen by further utilizing a fluorine source in the first etchant mixture, as per Shoji, in view of Shoji's disclosure about the benefits of such an etchant mixture.

In regard to claims 8 and 12-35, these claims differ from the claims discussed above by adding the further limitations of specific power ranges and concentrations. Although not disclosed by Chen or Shoji, it is the Examiner's position that the variation of result-effective process parameters, such as concentration and power, would have been obvious to one of ordinary skill in the art, if only for experimentation purposes, in order to determine the optimum process conditions.

Response to Arguments

6. Applicant's arguments with respect to claims 1-35 have been considered but are moot in view of the new ground(s) of rejection.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vanessa Perez-Ramos whose telephone number is 703-306-5510. The examiner can normally be reached on Mon-Thurs 7:00am-5:30pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on 703-308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-306-5665.

Vanessa Perez-Ramos
Examiner
Art Unit 1765

VPR
March 9, 2003



ROBERT KUNEMUND
PRIMARY EXAMINER